

portrayal of domestic subjects reminds us how peculiarly they are a woman's province.

If all elder girls are taught that the air, food, clothing, washing, rest, and exercise of a baby must, to ensure its health, conform to lessons of experience, if this teaching be based upon reasoned explanations, not only will babies benefit, but young mothers will not discontinue to use their reasoning for the wants of the growing child.

The more liberal views recently adopted by the Board of Education should expedite this reform.

Boys would welcome any teaching that explained how they can best gain and keep strength, and if incidentally they are taught that the habit of drinking more than a pint of beer a day may entail a penalty on health, even if a long-deferred penalty, they will have learnt a fact not one working man in twenty is conscious of to-day. The recent actuarial evidence of the United Kingdom Provident Institution proves that the duration of an abstainer's life, age thirty, is 11 per cent. longer than that of the ordinary temperate insurer.

Teaching will also probably do more for a pure milk supply and for the benefit of a rural population than legislation. Neglect of all subjects bearing on rural occupation in rural school teaching is in itself a lesson to the rustic to ignore such study. How many farmers have heard of cooperative credit, or even know the meaning of the word tuberculosis?

It is pleasant to read how some attempts at amelioration are commencing in the vivid descriptions of the teaching of domestic subjects, the out of school recreation classes, the different systems of physical education, and the practice of physical culture in elementary schools.

Knowledge of the health of the growing child should, we agree, be gained by genuine and efficient observation; as Dr. Bulstrode writes:—"if an officer were appointed to test sight and hearing, detect deformity and reduce the hours of working of the physically and mentally unfit, the harvest would speedily be so abundant that further action would follow in a similar direction."

It is to be hoped this useful and interesting work may come out in a cheaper form, so that it may instruct a wider circle.

Prof. Mosso has long taught us the principles of physical education in his work upon "Fatigue," and in 1893 he published a brief comparative study of the practices in vogue among Continental nations and in England. The present work extends over a wider field. Its nucleus consists of three lectures, part of a course of lectures upon physical education recently instituted in Turin for teachers of gymnastics; they are "Origines et Decadence de l'Agonistique et de la Gymnastique," "L'Agonistique moderne," "L'Education physique dans les Universités," and chapters have been added upon the training in ancient Rome, State control, "pédagogie," on the physique of the scholar, and on women's education in America.

Prof. Mosso is an entertaining writer; he sees equally the picturesque side of physical education

whether in the palæstra of ancient Greece or at Wellesley College among American girls. In many countries has he travelled, made inquiries on the spot and studied their literature. Accordingly, a broad-minded attitude prevails in this book, and the problems of physical education are viewed from a multiplicity of aspects; but the theme of his title is not systematically developed.

One gathers generally that the early days of Greece and Rome with the American student of to-day represent the best combinations of physique and intellect.

Games in the open air are to be encouraged rather than exercises in a hall; the former will include more moral and intellectual improvement. For these games Prof. Mosso adopts the term "agonistique," which has hitherto been applied to the rivalry of athletic sports rather than to the larger congregation who should join in the recreative game. The change of meaning in this hitherto little used word is to be deprecated.

It is pointed out that the word recreation may convey its literal sense if one recognises that those same cells of psychomotor centres which have been engaged in thought and inhibiting motor impulses are re-animated by recreative exercise after study. In devoting themselves to motor activities, the reaction is one that regenerates these nerve cells.

The book affords a pleasant general discussion upon the physical side of education.

HUGH R. BEEVOR.

#### FISH-PASSES AND FISH-PONDS.

*Fischwege und Fischteiche. Die Arbeiten des Ingenieurs zum nutzen der Fischerei.* By Paul Gerhardt. Pp. 147; 142 woodcuts in text. (Leipzig: Wilhelm Engelmann; London: Williams and Norgate, 1904.) Price 5s. net.

IT is a strange thing that in the articles upon river engineering in the latest edition of the "Encyclopædia Britannica" there is no reference to the construction of fish ladders, nor is there, we believe, any comprehensive work upon this subject which has been produced in Britain. The present work is intended primarily for the purpose of instructing engineers in that branch of fresh-water engineering which concerns fishery matters.

The author rightly insists upon the necessity of engineers who propose to undertake the planning and building of fish passes or ponds knowing the habits of the fishes concerned, and in his "Einleitung" of nineteen pages sets out concisely the necessary information in this direction. His statements in some cases, however, for example with regard to the habits of the salmon in the sea and in the river, appear to us somewhat too "cut and dried" considering the speculative condition of our knowledge upon the subject.

The second part of the book deals with fishways, and after a general dissertation upon their importance

the various forms of fish pass are considered—the pool fishway, the oblique pass, queen's gap, and the various forms of fish ladders. The various forms are described, but are quite insufficiently criticised. The oblique groove, "Schrägpasse" (under which, by the way, is included the queen's gap pass, "Wehreinschnitt") is dealt with at some length, although it, *i.e.* the oblique groove, was years ago considered utterly useless in Britain, where it was chiefly tried.

The information upon fish ladders is arranged under headings "Fischtreppen mit Stegen," "Fischtreppen mit Sperren u. Einschnitten," and "Lachstreppen mit Sperren u. Schlupföffnungen," no distinction being drawn between step fishways and inclined fishways, although, in Britain and America at any rate, the latter form has been considered vastly superior to the former.

Seeing that the author in his preface undertakes the consideration of foreign fishways as well as of German ones, we should have expected to see more fish ladders described and discussed, especially those of this country and America, where this branch of engineering has had plenty of scope. The "Smith's Ladder" at the lower falls on the Ballysadare River is described and figured, but no mention is made of the ladder at the Collooney Falls on the same river, which is a combination of Cail's and Smith's inventions. The first Smith's pass, and one of the most successful in Scotland—that at Deanstone, on the Teith—surely deserved mention, as did the inventor. The "queen's gap" at Poolquay Weir, on the Severn, is described in detail, although the weir was washed away in 1881, and has never been rebuilt.

Part iii. is devoted to fish-ponds. There is only one reference to an English fish farm, and none of the numerous American hatcheries, where pond construction has been carefully studied, are mentioned.

Much of this part of the book is of less value from the British fish culturist's or engineer's point of view, because in Germany coarse fish, such as the carp, are a staple food, and are reared in large numbers, whereas most of our fish culture is concerned with the Salmonidæ. As the author says:—

"Der Karpfen ist derjenige Fisch, der sich am besten für die Teichwirtschaft eignet. Er ist ein Edelfisch, leicht zu ziehen und schnellwüchsig, so dass er gute Erträge liefert,"

and this section of the book is written very much from this point of view.

Much of the information as to the construction of ponds and their inlets and outflows is, of course, ancient, and can be found in such books as the "History of Howietoun," by the late Sir R. Gibson-Maitland.

The book is doubtless a useful exposition of some of the existing fish passes and ponds, but in such a work we should have expected to find fuller criticisms and summaries, for instance, as to the value of one form of pass compared with another.

On the whole, we think a more useful book could be written from a British engineer's point of view.

FRANK BALFOUR BROWNE.

## OUR BOOK SHELF.

*Photographic Chemicals and How to Make Them.* By W. Taylor. Pp. 107. (London: Iliffe and Sons, Limited.) Price 1s.

THIS small volume of a hundred pages consists of explanatory remarks on various chemical operations, such as filtering, weighing, boiling, and so on, and concise instructions for the preparation of twenty-one substances that are in common use by photographers. The author considers that "the processes may form a pleasant variation upon ordinary photographic methods." He adds that "it must not be supposed that there will be a saving of cost," but "the pleasure and amusement afforded by the manipulations, to say nothing of their value educationally, if followed out with due care, should do far more than compensate for the trifling increase in expense." The instructions given are clear and correct, and are illustrated by several good figures of really practical apparatus, but, as is often the case in such volumes, the style is uneven. If the book is intended for those who will profit by being told how to test with litmus paper and how to bend a glass tube, and need to have figures to show what kind of things a pestle and mortar, an evaporating dish and a pair of tongs are, then the descriptions of processes are far too lacking in detail. They are more of the character of instructions that might be given to a student of chemistry who has had experience in a well appointed laboratory. We very much doubt whether the author or anyone else has boiled away sulphuric acid "in an empty grate"—of an ordinary room, presumably. The open air is suggested as an alternative place for the performance of this and many other operations which would very speedily render it impossible to live in any room where they were going on. The risk of accidents or desirable precautions might have been set forth a little more prominently in case the volume should fall into the hands of those who know nothing of chemistry. However, there are many young people who have "done" a little chemistry at school, and these will no doubt find it useful. It may be noted that the method described for preparing anhydrous sodium acetate is not efficient; it is necessary to fuse the dried salt.

*Dictionnaire des Engrais et des Produits chimiques agricoles.* By E. S. Bellenoux. Pp. x+158. (Paris: Schleicher Frères et Cie., 1904.)

THIS is meant to be a handy book of reference for the farmer and the agricultural student, in which any material used in agriculture may be looked up and information obtained as to its nature, use, adulteration and the like. The arrangement is alphabetical under such heads as "analysis of the soil," "ash," "nitrogen," "purchase of manures"; the treatment is popular, and though results of experiments are occasionally given, there are no references. The scheme of the book causes a good deal of overlapping, and we doubt if the same end of easy reference would not be better attained by a good index to an ordinary book covering the same ground. The information provided is not very well selected nor always correct; for example, we read, "le sulfate d'ammoniaque a, au contraire, la propriété de remonter des profondeurs du sol où l'eau peut l'avoir entraîné et de revenir à la surface: c'est un sel *grimant*, ainsi qu'on l'a dénommé, et c'est cette propriété spéciale qui le fait employer avant l'hiver afin que les pluies le fassent pénétrer jusqu'aux racines. Si on l'emploie au printemps, il faut l'enfouir par un labour et ne jamais le répandre en couverture. . . . L'azote du sulfate d'ammoniaque est directement assimilable par les plantes."